United States
Department of
Agriculture

Soil
Conservation
Service

Washington, D.C.

in consultation
with

USDA Salinity Control
Coordinating Committee

1982 Annual Report Colorado River Basin Salinity Control Program

1982

USDA ANNUAL REPORT

COLORADO RIVER BASIN SALINITY CONTROL PROGRAM

PREPARED BY
Soil Conservation Service
U.S. Department of Agriculture
Washington, D.C.
in consultation with
USDA Salinity Control Coordinating Committee

FOREWORD

The Colorado River Basin Salinity Control Act of June 24, 1974, (Public Law 93-320) provides for the enhancement and protection of the quality of water available in the Colorado River for use in the United States and Mexico. This 1982 Annual Report on the Colorado River Basin Salinity Control Program (CRBSCP) has been prepared to explain the progress, the activities, and the salinity control accomplishments achieved by the U.S. Department of Agriculture (USDA) program. USDA has continued to maintain reasonable progress with implementation of onfarm irrigation improvement and salinity control under authority of existing programs. However, with modest funding increases and legislative authority to establish a separate USDA onfarm salinity control program for the Colorado River Basin, USDA feels further improvements in the program may be achieved in the years ahead.

1982
USDA ANNUAL REPORT
COLORADO RIVER BASIN SALINITY CONTROL PROGRAM

I. EXECUTIVE SUMMARY

This 1982 USDA Annual Report on the CRBSCP presents an abbreviated overview of the many activities addressed during the past year. The report serves as an informational document which explains USDA accomplishments during 1982 and identifies some key activities projected for 1983. It is intended that this annual report receive widespread distribution to USDA agencies, U.S. Department of the Interior (USDI) agencies, U.S. Environental Protection Agency (EPA), the Advisory Council, the Forum, and other cooperating agencies or interest groups.

Overview

1. Average annual salinity concentrations of the Colorado River increase progressively as it flows downstream from about 50 milligrams per liter (mg/l) in the headwaters to about 820 mg/l at Imperial Dam. Without upstream salinity control, concentrations are projected to reach about 1140 mg/l by the year 2000.

2. Irrigated agriculture contributes 37 percent of the total annual salt load to the Colorado River above Hoover Dam.

3. Average annual downstream damages for each mg/l increase in salinity at Imperial Dam costs approximately $513,000 (January 1982). Therefore, each ton of salt load reduction provides about $50.00 worth of average annual benefits.

Title I Wellton-Mohawk

1. The Wellton-Mohawk project objectives are to reduce average annual return flows to 108,000 acre feet per year. The 1981 return flows were 153,000 acre feet and are projected to be reduced to 108,000 acre feet by 1986.

2. Plans and contracts have been executed on 237 farms covering 33,600 acres out of 327 applications for 52,600 acres in the Wellton-Mohawk project. Complete irrigation water management and application have been achieved on 26,400 acres.

Title II

1. The McElmo Creek (CO) and Virgin Valley (NV, AZ) irrigation salinity control studies were completed in 1982 making a total of seven completed studies.

2. In the Grand Valley, the Agricultural Stabilization and Conservation Service (ASCS) received 297 requests for cost-sharing in 1982 with SCS servicing 228 applications. There were 185 who completed at least one or more water management and salinity control practices. Over 1,400 separate requests have been received with nearly 900 participants applying at least one practice since 1979.

3. The Soil Conservation Service (SCS) has developed 195 irrigation water management plans in Grand Valley on 5,473 acres.

4. In the Uinta Basin, 313 long term agreement (LTA) requests have been received on 32,892 acres. A total of 162 contracts on 17,501 acres have been signed.

5. For 1982, the Grand Valley project achieved an estimated salt load reduction of 17,700 tons per year for a 1.84 mg/l reduction of salinity at Imperial Dam. The Uinta Basin achieved a reduction of 12,850 tons per year for a 1.34 mg/l reduction at Imperial Dam.

6. The Agricultural Research Service (ARS) activities include research on use of saline or brackish water on salt tolerant crops, electromagnetic soil salinity probe, level basins, and new automated "cablegation" irrigation systems. Two successful cablegation systems have been installed in Grand Valley.

7. Funding levels for 1983 will continue at about the same rate as 1982; however, ARS has received a $600,000 increase for expanded Colorado River salinity control research.

8. FY-84 funding proposes a USDA consolidated account and requests budget increses for expanded implementation.

9. S.2202 has been reintroduced as S.752 and HR 6097 has been reintroduced as HR 2790. It is anticipated that this legislation will provide the necessary legislative authority for a special USDA onfarm salinity control program.

10. The 1983 activities will include present efforts, plus new initiatives in: 1) monitoring and evaluation; 2) legislative authorities; 3) funding; and 4) program rules and regulations consistent with national soil and water conservation objectives.

II. INTRODUCTION

A. General

USDA involvement in the CRBSCP started in the early 1970's. As the United Sates and Mexico began to deal with the international problem of increased salinity concentrations in the Colorado River in the late 1960's, it became increasingly evident that much of the problem (and subsequently much of the solution) was associated with irrigated agricultural lands. Because of the extensive experience, knowledge, and technical expertise in agricultural irrigation, USDA's eventual involvement in addressing the Colorado River salinity problems was inevitable. USDA has become increasingly involved in a somewhat evoluntionary process. Initially, USDA participation was regarded more as consultive and supportive to the salinity control initiatives of USDI and the program leadership of the U.S. Bureau of Reclamation (BR). As the causes of salinity problems became more clearly defined and the solutions to salinity control were more clearly identified, it became clear that onfarm agricultural salinity control would be very cost-effective, and a logical solution to solving a major part of the salinity problem.

B. The Colorado River Basin

The Colorado River Basin encompasses portions of seven States: Colorado, Wyoming, Utah, Nevada, New Mexico, California, and Arizona. (See Figure II-1). The river is 1,400 miles long, with its headwaters in Wyoming and Colorado. It empties into the Gulf of California and serves some 14.5 million people on its way. It is one of the most physically developed and regulated rivers in the Nation. In 1964, the waters were totally consumed and flows no longer reached the Gulf of California.

The river flow is apportioned among Upper and Lower Basin States and the Republic of Mexico. There are some 2.6 million acres of private irrigated cropland and some 44 million acres of nonfederal forest and rangeland within the United States' portion of the Basin.

Because waters of the Colorado River serve as the primary life-line for much of the seven Basin States, there are many different uses for the Colorado River. Irrigation water is the major use; however, many municipal and industrial users are dependent upon Colorado River water. There are numerous hydro-electric power plants on the Colorado River. Therefore, the Colorado River goes through a continuous use and reuse cycle which involves irrigation, hydro-electric power, and municipal and industrial uses.

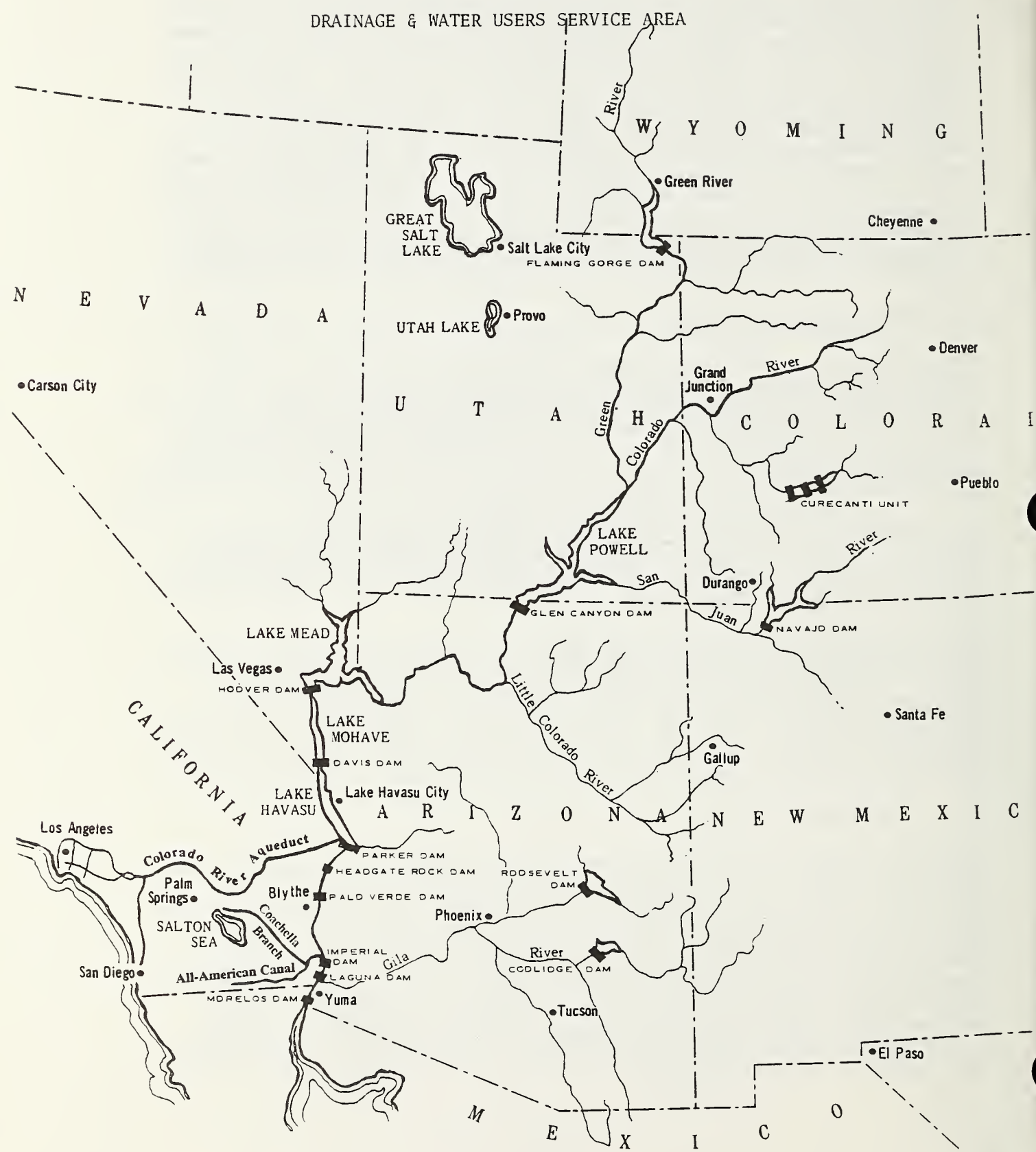
C. The Salinity Problem

Salinity problems in the arid and semiarid areas of the United States are a critical concern to those involved in the management of our natural resources. The salinity problem can take two forms. One is salinity buildup in the soil root zone that reduces or precludes an economic return from growing agricultual crops. The other is excessive salinity in groundwater, lakes, streams, and rivers that reduces or precludes their use for irrigation, domestic, municipal, and industrial water supply or for fish and wildlife habitat. Specialists agree that improved irrigation management, in most circumstances, offers an effective approach towards reducing the contribution to salinity in river systems from irrigation. Frequently, it is the most cost-effective option available.

Figure II-1

COLORADO RIVER BASIN

DRAINAGE & WATER USERS SERVICE AREA



As salinity concentrations increase, the damages and impacts become more severe. For irrigated agriculture, salinity levels of 500 to 700 mg/l begin to have a detrimental impact on net returns. Higher salinity levels create increased operating costs, supressed crop growth, and ultimatley adversely effects yields. As salinity concentrations exceed 700 mg/l, the cross-section of salt tolerant crops becomes more restricted and limiting. Normally salt tolerant crops do not provide as favorable an economic return that the more salt sensitive crops do. Salinity levels in excess of 1000 to 2000 create severe crop production problems because of the need for specialized and extremely costly irrigation management practices.

With the maximum safe drinking standard set at 500 mg/l, salinity concentrations of over 500 mg/l also becomes costly for municipal, industrial, and residential homeowners to treat. The increased salinity concentration also has a corrosion and deteriorating effect on pipelines and home appliances.

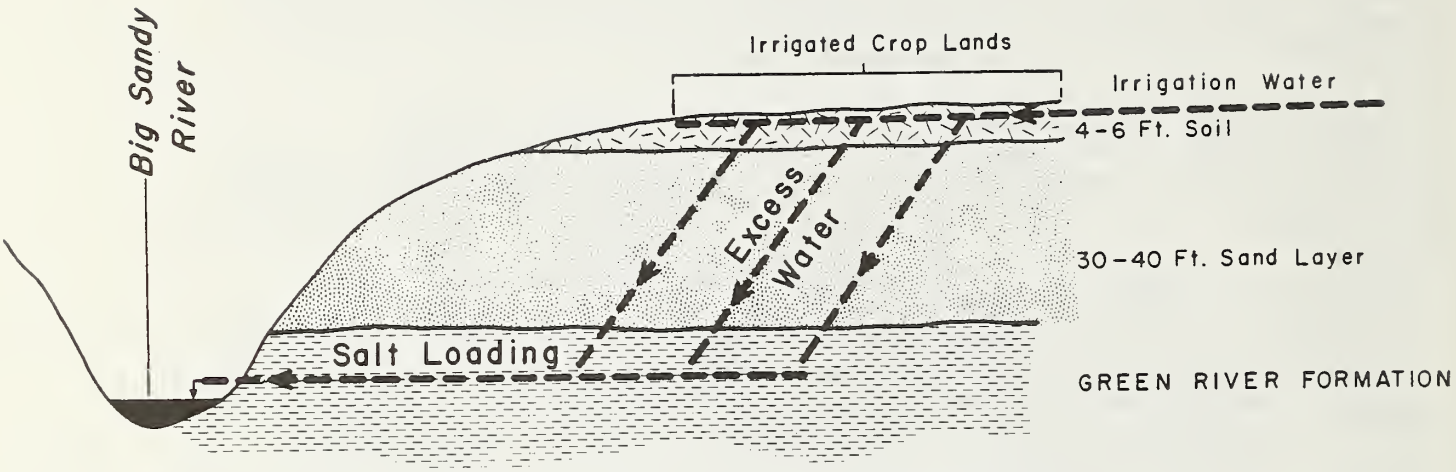
Within the Colorado River, increased salinity levels are caused by two different processes: 1) salt concentrating; and 2) salt loading. The "salt concentrating process" essentially involves the loss of waters by reservoir evaporation, export, and by evapo-transpiration of irrigated crops. As excess waters are evaporated and used by the plants, residual salts are left behind to concentrate in the soil and/or remaining waters. The "salt loading process" occurs as seepage and deep percolation dissolves mineral salts in the surface soils and highly saline geologic formations as it returns to the river system. As additional salts are picked up, the total salt burden or load carried by the river increases. Figure II-2 provides a good example of the salt loading process from over-irrigation in the Big Sandy irrigated area.

In 1962, the salinity of the water delivered to Mexico increased from an annual average of about 800 mg/l to nearly 1,500 mg/l. This was primarily attributed to the highly saline drainage return flows from the Wellton-Mohawk Irrigation and Drainage District area, which empties into the Colorado River below Imperial Dam, and partially to the concentrating effects and salt loadings from upstream water development.

The total salt load in the river entering Lake Mead above Hoover Dam is estimated to average 9 million tons per year. To meet the salinity control objective of the Colorado River Basin Salinity Control Act, it is necessary to remove some 2.8 million tons of this salt load per year. The present average annual salinity concentration of the river varies from about 50 mg/l in the headwaters to about 820 mg/l at Imperial Dam. The USDI projects a future salinity level of 1,141 mg/l at Imperial Dam for the year 2000 as additional upstream development takes place, assuming no corrective action is taken. The long-term average annual salinity concentration at Imperial Dam is 875 mg/l under current development conditions. Each mg/l increase in salinity concentration at Imperial Dam causes approximately $513,000 per year (1982 dollars) in economic damages to downstream agricultural, municipal, and industrial water users within the United States. It has been estimated that irrigation contributes about 37 percent of the total salt load to the river above Hoover Dam. Natural sources contribute 47 percent with reservoir evaporation (12 percent), exports (3 percent), and municipal and industrial use (1 percent) contributing the balance.

Average onfarm irrigation and distribution system efficiencies, especially in the Upper Basin, are generally low. Low irrigation efficiencies generally indicate high surface runoff and/or over-irrigation. Over-irrigation can result in excessive deep percolation which leaches salts from the soil into the river. This greatly contributes to the salinity problem.

Figure II-2 The Salt Loading Process



SOURCE OF SALT LOADING

There are approximately 1 million acres of irrigated cropland in 17 identified salt sources units in the Colorado Basin. Ten of these units are presently considered feasible salinity control projects and would involve treatment on nearly 700,000 acres of irrigated cropland upon full implementation.

D. The Colorado River Basin Salinity Control Act

Salinity Control in the Colorado River Basin is addressed in the Colorado River Basin Salinity Control Act of 1974, Public Law 93-320. The Act has two major sections. Title I of the Act relates to maintaining the water quality (salinity concentrations) standards which the United States agreed to on August 30, 1973, in Minute 242 of the International Boundary and Water Commission for water delivered to Mexico under the Mexican Water Treaty of 1944. This section relates to a program for improving irrigation efficiencies and reducing highly saline irrigation drainage return flows from the Wellton-Mohawk Irrigation and Drainage District. Title I also authorizes the USDI to proceed with the design and construction of a large desalinization plant to treat excess irrigation drainage return flows from the Wellton-Mohawk area.

Title II of the Act deals specifically with the salinity concentrations in the Colorado River above Imperial Dam, and the controls necessary to meet United States water quality (salinity concentration) standards established by the seven basin States and the EPA. The Secretary of Interior was authorized to undertake various investigations and studies to determine the nature of salt loading problems, potential salinity control solutions, and costs. The Secretary also received authorization to proceed with construction of certain salinity control projects.

More importantly, the Act instructed the Secretary of Interior "to coordinate and cooperate with the Secretary of Agriculture and the Administrator of the EPA" regarding diffuse and non-point source areas of salinity. Title II further instructed the Secretary of Agriculture to use "existing programs" available to that Department to assist with salinity control.

USDI assigned leadership responsibilities for the Act to the BR, and USDA assigned program leadership to the SCS. USDA's involvement is documented in a 1974 Memorandum of Understanding with USDI and in a 1975 Memorandum of Agreement between the SCS and the BR.

E. Benefits

Benefits related to water quantity, water quality, and reduced salt loadings are major factors in the onfarm salinity control projects. Completed reports indicate onfarm irrigation efficiency improvements and salinity control practices will reduce salt loads by 19,000 tons per year in Moapa Valley and to as much as 335,000 tons per year in Lower Gunnison. Table II-I shows the salt load reductions and salinity concentration reduction impacts at Imperial Dam for six onfarm salinity control projects. USDA has not recommended a plan for the Big Sandy unit because of the continued off-farm salinity control planning being conducted by the BR.

Table II-I - Salinity Control Impacts at Imperial Dam for Recommended Plan

Irrigation Unit Areaa	Salt Load Reduction (Tons)	Reduced Salinity Concentration (mg/1)
Grand Valley (CO)	230,000	24
Uinta Basin (UT)	76,000	10
Moapa Valley (NV)	19,000	2
Lower Gunnison (CO)	335,000	35
Virgin Valley (NV, AZ)	37,000	4
McElmo Creek (CO)	38,000	4
Big Sandy (WY)	No Recommended Plan	

These reductions provide significant water quality benefits based upon $513,000 average annual downstream damages for each mg/1 increase in salinity concentration at Imperial Dam.

The major benefits from the CRBSCP are national and regional in scope. The national need is to maintain the salinity differential in the Colorado River water delivered to Mexico in accordance with the 1973 agreement (Minute No. 242 of the International Boundary and Water Commission, United States and Mexico). The regional need is to maintain current salinity levels in Colorado River water withdrawn for downstream use while allowing the Basin States to further develop its compact-apportioned waters.

III. USDA TITLE I ACTIVITIES

USDA activities under Title I of the Colorado River Salinity Control Act are primarily related to improving irrigation efficiencies, reducing deep percolation, and reducing highly saline irrigation and drainage return flows from the 65,000 acre Wellton-Mohawk Irrigation and Drainage District in Yuma County, Arizona. As farmers over-irrigate, excess and unused irrigation waters percolate down through the soil profile creating a high water table enriched with high salinity levels. To overcome the agricultural production problems caused by salinity build-up and poor drainage, pump-drainage wells are used to lower the saline high water tables. This "pumped" drainage water, with salinity concentrations ranging from 3,000 to 6,000 parts per million (PPM), is then removed from the Wellton-Mohawk area through drainage canals and ditches discharging into the Colorado River. These highly saline return flows then cause increased salinity concentrations in the Colorado River waters delivered to Mexico. This highly saline drainage return flow created the downstream salinity problems for Mexico in the 1960's which led to Minute No. 242, and the passage of Public Law 93-320, the Colorado River Basin Salinity Control Act.

In conjunction with the BR planning for the desalting plant authorized in Title I of the Act, an Advisory Committee on Irrigation Efficiency and a support Technical Field Committee on Irrigation Efficiency were created. The interagency committees were formed to develop alternatives to improve irrigation efficiencies and to reduce drainage return flows. This would ultimately reduce the size and costs of building and operating a large desalting plant. A 1974 "Special Report: Measures for Reducing Return Flows from the Wellton-Mohawk Irrigation and Drainage District" includes the specific recommendations for installing onfarm measures and technical assistance.

The recommended onfarm program essentially included structural onfarm improvement measures, technical assistance through SCS, and Federal cost-share through individual conservation plans and long-term contracts. The initial program established in 1974 included irrigation system improvements and water management on 23,800 acres in a five-year period. Recommended cost-sharing was established at 75 percent Federal and 25 percent landowner or farm operator. The combined impact of the USDA onfarm program, the BR Irrigation Management Scheduling program, and the BR 10,000 acre acreage reduction program were projected to increase district-wide irrigation efficiencies from 55 percent up to 72 percent. Drainge return flows were also projected to be reduced from approximately 200,000 acre-feet per year down to 136,000 acre-feet.

In 1979, the Technical Field Committee on Irrigation Efficiencies recommended the onfarm program be expanded to include treatment on an additional 19,000 acres with all other irrigation lands being eligible for a water management plan. The Advisory Committee's recommended implementation program to improve onfarm irrigation efficiencies will further reduce return flows to 108,000 acre-feet per year. The implementation program is scheduled to continue through 1986.

The Wellton-Mohawk onfarm program is fully funded by the BR. Under authority of the USDI and USDA Memorandum of Understanding (November 1974) and a BR-SCS Title I Memorandum of Agreement (December 1974), the BR periodically reimburses the SCS for cost-sharing expenditures and technical assistance costs. The SCS enters into direct landowner or operator contracts to install conservation practices that contribute directly to the objectives of the

program. The contract is based upon irrigation water management plans developed with SCS technical planning assistance. The contract provides for technical and cost-share assistance on design and installation of water management practices. There are provisions for irrigation water management efficiency compliance checks over a two-year period following installation of practices.

The SCS establishes planning and implementation priorities to more effectively use the resources allocated to the program. Priorities are established by considering current irrigation efficiencies, crops grown, adequacy of onfarm systems, and soil characteristics. Lands with greatest potential for increasing efficiencies and decreasing drainage return flows receive highest priorities. All plans and SCS contracts are reviewed and approved by the governing Board of Supervisors for the Wellton-Mohawk Valley Natural Resource Conservation District.

Figure III-1, Wellton-Mohawk Applications, Contracts, and Treatments (acres by year) shows the overall progress since the program was initiated. Figure III-2, Wellton-Mohawk Applications and Plans/Contracts (numbers by year) also reflects the annual number of participants assisted.

As of 1982, 327 applications for assistance on 52,600 acres were received. Irrigation water management plans and contracts have been developed on 237 farms covering 33,600 acres. Of these, 26,400 acres have been fully treated and are presently under a continuing irrigation water management program.

In 1982, 21 applications were received for 3,700 acres. Completed plans and contracts were signed on 30 farms covering 3,550 acres. All land treatment and water management improvement practices for salinity control were applied to 6,340 acres in 1982. Technical assistance for continued irrigation water management will be provided on these acres over the next two years as part of the follow-up program.

Table III-1 presents a summary of 1982 accomplishments and the total practices installed to date. Figure III-3 illustrates the downward trend in drainage return flows from 1975 through 1981. These downward trends can be attributed to the combined effects of the USDA onfarm program and the BR's acreage reduction program and Irrigation Management Services. It is interesting to note the initial 1974 return flow goal of 136,000 acre-feet per year has nearly been achieved and the 108,000 acre-feet revised goal established in 1979 should be achieved if the same downward trend continues through 1986. The slight annual increase in 1977 and 1980 are a result of increased drainage flows attributed to flooding influences of the Gila River.

Figure III-1

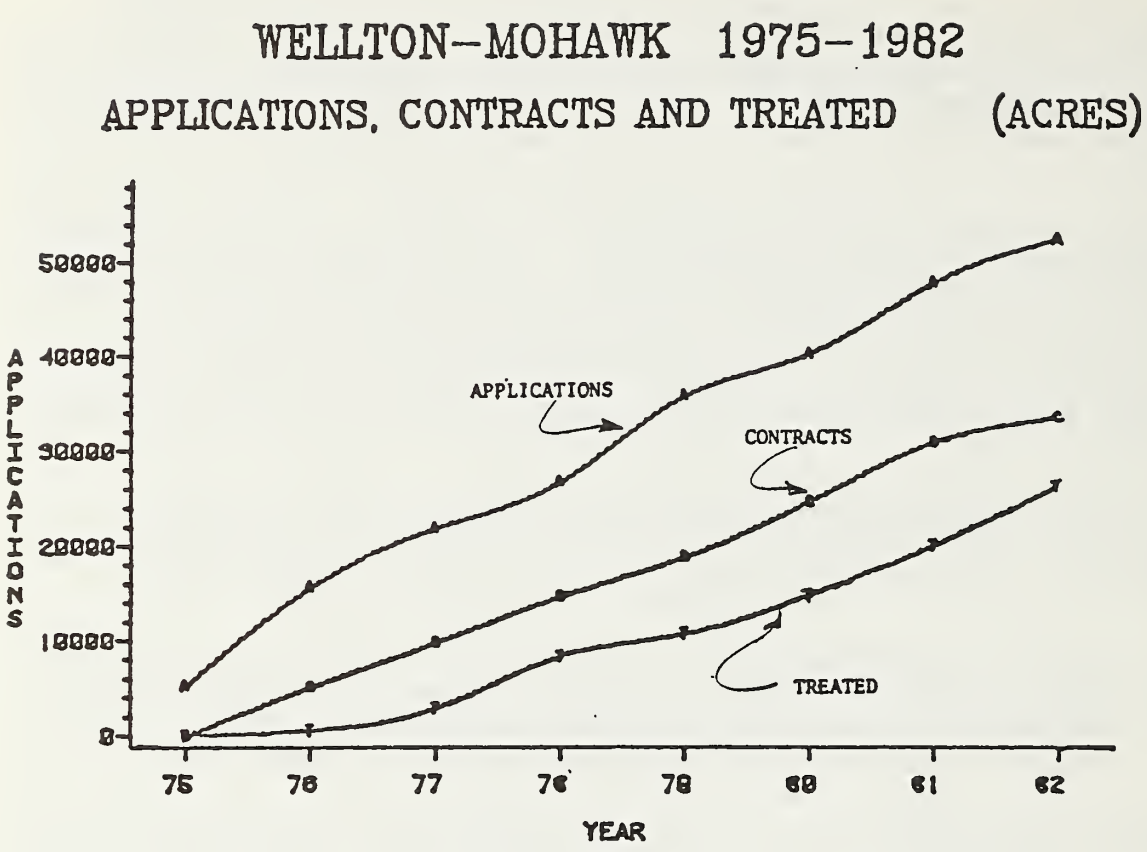


Figure III-2

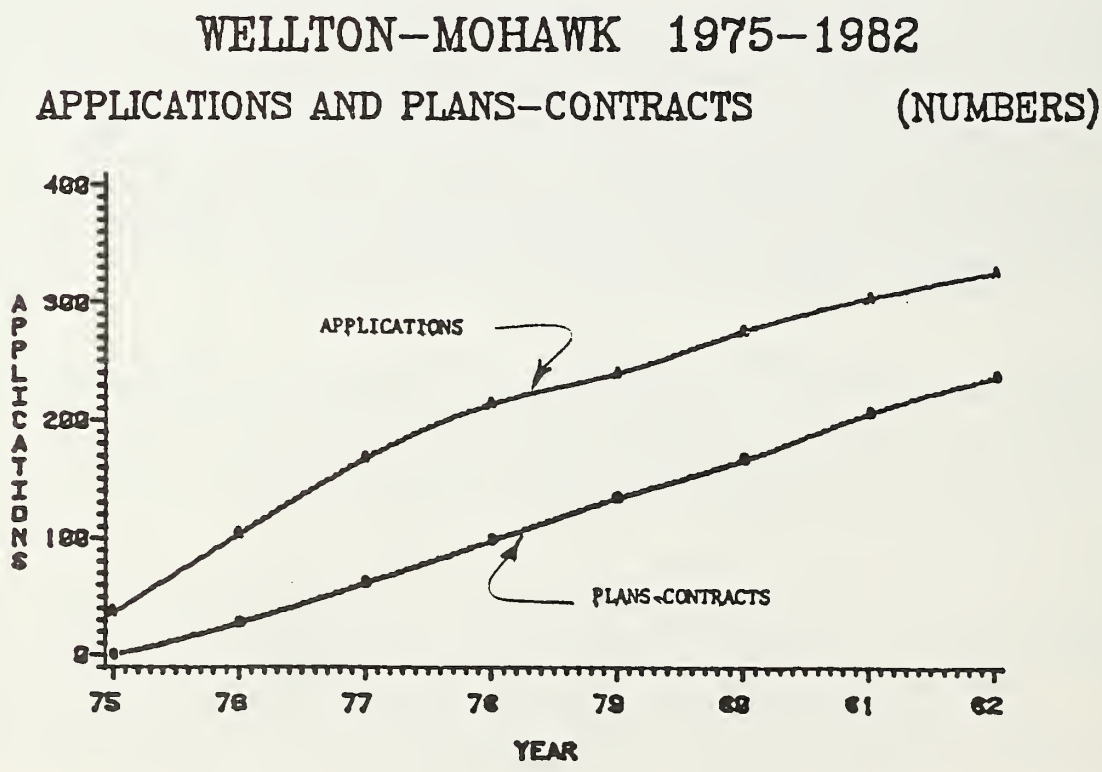


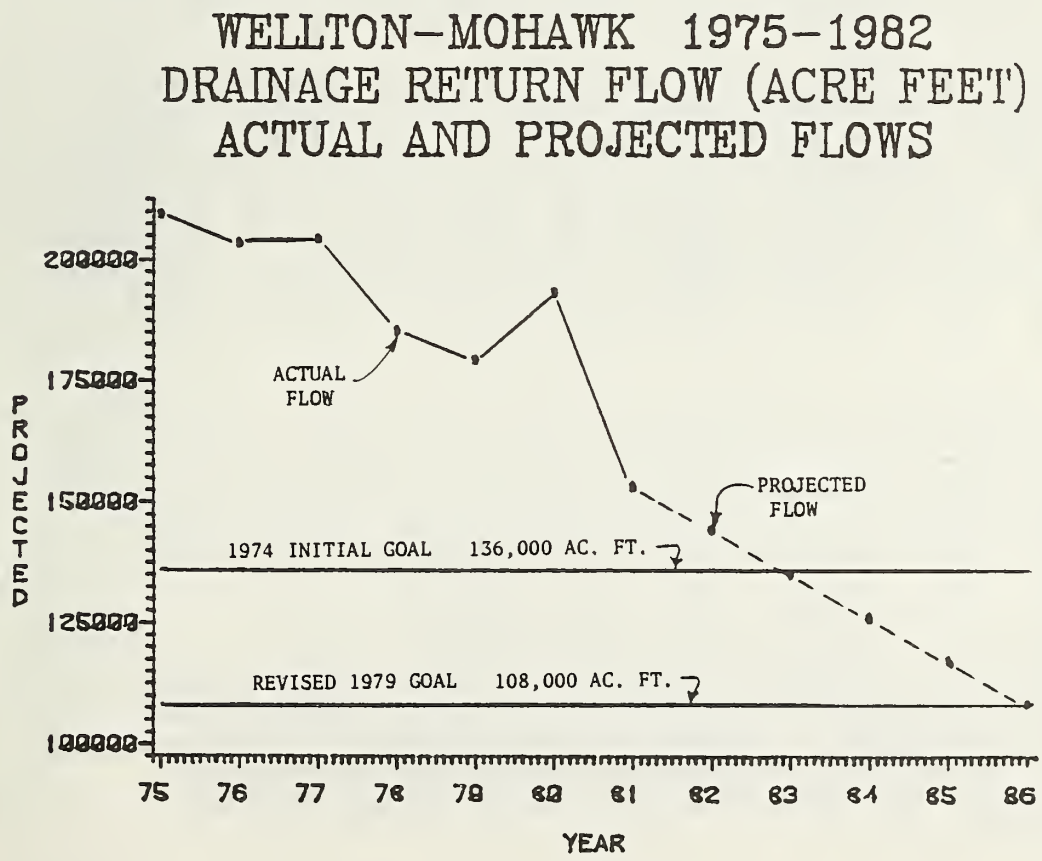
Table III-I

Practices Installed
SCS Onfarm Improvement Program
Wellton-Mohawk Irrigation and Drainage District

PRACTICES		1982	CUMULATIVE
1. Ditch Lining	(FT)	128,571	961,656
2. Land Leveling	(AC)	4,902	30,950
3. Structures for Water Control and Measurement	(NO)	1,012	7,136
4. Soil Improvement	(AC)	214	1,870
5. Pumping Plants	(NO)	0	10
6. Drip, Bubbler Irrigation Systems	(NO)	1	10
7. Vertical Underground Barriers	(FT)	7,877	14,505
Federal Cost	$	$ 2,117,401	$ 11,540,746
Nonfederal Landowner Cost	$	705,800	3,846,915
Total Cost 1/		$ 2,823,201	$ 15,387,661

1/ Excludes 1982 SCS technical assistance costs of $370,970 and total SCS technical assistance to date of $2,395,273.

Figure III-3



IV. USDA TITLE II ACTIVITIES

Title II activities include a broad range of USDA agencies inputs into the planning and implementation of an agricultural onfarm salinity control program.

Specific language in Title II of Public Law 93-320, the Colorado River Basin Salinity Control Act, directed the Secretary of Interior, the Administrator of the EPA, and the Secretary of Agriculture to "cooperate and coordinate their activities effectively to carry out the objectives of this title". In fulfillment of the legislative directive, the Secretary of Interior and the Secretary of Agriculture entered into a Memorandum of Understanding in November, 1974. A subsequent Memorandum of Agreement has been executed between the BR and the SCS, and, in addition, an internal USDA Memorandum of Agreement between various USDA agencies has been executed. The various activities and accomplishments of the USDA agencies are further explained in the remainder of this section. The major program areas addressed by the USDA agencies are: 1) irrigation salt source area studies (SCS); 2) implementation technical assistance (SCS); 3) implementation cost-sharing (ASCS); 4) extension eduction (ES); 5) research and demonstration (ARS, CSRS); and 6) monitoring and evaluation (SCS).

A. Irrigation Salt Source Area Studies

This activity is a planning function under leadership of SCS. The objectives of these studies are: 1) to identify salt source areas; 2) to determine salt loading estimates; 3) to evaluate treatment alternatives and salt load reduction impacts; and 4) to develop recommended implementation plans and associated implementation costs. These detailed salinity control studies and investigations are being funded using river basin study authorities of Section 6 of Public Law 83-566. Full coordination is maintained with the BR, the EPA, and interested State and local agencies or organizations through various coordinating committees at the local project level.

Table IV-1 presents the current status of the 17 identified irrigation salt source area studies. It is noted that the Virgin Valley and McElmo Creek studies were both completed in 1982; however, McElmo Creek was not published until February 1983. With publication of the Virgin Valley and McElmo Creek reports, USDA has completed seven salinity control studies on over 500,000 acres. If fully funded and implemented, these seven salinity control projects would reduce Colorado River salt loading by nearly 750,000 tons per year which translates into a reduction in salinity concentrations at Imperial Dam of 82.9 mg/l.

Salinity control planning activities for FY-83 will be somewhat minimal with only modest planning activities underway in the Price-San Rafael (UT) and the scheduled completion of Mancos Valley (CO). USDA anticipates adequate funding to resume a more intensive planning effort in FY-84. Other salt source areas with no anticipated study activities at this time either lack significant salinity control benefits or local support to initiate a planning study.

B. Implementation Technical Assistance and Cost-Sharing

In Public Law 93-320, the Secretary of Agriculture was directed "to cooperate in the planning and construction of onfarm system measures under programs available to that Department". Present USDA implementation projects are being carried out under authority of the existing SCS conservation technical assistance program and the ASCS Agricultural Conservation Program (ACP) cost-sharing authorities.

Colorado River Basin Salinity Control Program
Irrigation Salt Source Unit Studies
Status Report

Area	Study Status	Impl. Start	Remarks
1. Grand Valley (CO)	Publ. - Dec. 1979	1979	Modified schedule extends implementation to 1993
2. Uinta Basin (UT)	Publ. - Jan. 1979	1980	Modified schedule extends implementation to 1994
3. Big Sandy (WY)	Publ. - Nov. 1980	1985	USBR off-farm and USDA onfarm alternatives being reassessed in conjunction with State of Wyoming
4. Moapa Valley (NV)	Publ. - Feb. 1981	1984	Pending implementation funding in FY-84
5. Lower Gunnison (CO)	Publ. - Sept. 1981	1986	Proposed to rescope implementation plan with priority areas and impelementation phases
6. Virgin Valley (NV, AZ)	Publ. - March 1982	1984	Pending implementation funding in FY-84
7. McElmo Creek (CO)	Publ. - Jan. 1983	1992	Implementation extended to future years
8. Price-San Rafael (UT)	Underway-Scheduled 1984	1987	FY-83 planning suspended, will maintain USBR liaison, study to resume in FY-84
9. Upper Virgin (UT)	Temporary Suspension	1992	Study activities to resume pending funding in FY-84
10. Mancos Valley (CO)	Underway-Scheduled 1983	1995	Study wrapup in FY-83. Implementation extended to 1995 - subject to change
11. Little Colorado River (CO)	Publ. - Dec. 1981	—	No recommended plan or salinity control benefits identified
12. Colorado River Indian Reservation (AZ)	Underway-Scheduled 1984	—	General river basin study underway, no major salinity control benefits or implementation anticipated
13. Palo Verde (CA)	Inactive	—	Anticipate planning activities for FY-84 pending funding
14. Dirty Devil (UT)	Inactive	—	No anticipated activities at this time
15. Roaring Fork (CO)	Inactive	—	No anticipated activities at this time
16. Henry's Fork (WY)	Inactive	—	No anticipated activities at this time
17. Lyman (WY)	Inactive	—	No anticipated activities at this time

The SCS provides program leadership for technical assistance to individual landowners and operators. Major services that the SCS provides include assisting landowners in developing irrigation water management and salinity control plans, designing and installing irrigation improvement practices, and subsequent water management follow-up assistance with indiviudal irrigators to improve irrigation application techniques and assure proper maintenance. Because of the many complexities associated with irrigation water management and salinity control, and because of the high level of technical expertise needed to assist individual landowners, the entire technical assistance program demands a substantial workforce of fully trained technicians.

There also needs to be significant incentive for individual landowners to invest in sophisticated water management systems which essentially provide for off-site benefits to downstream users as opposed to providing major onfarm benefits. Because of the significant off-site or downstream benefits, a reasonable level of cost-sharing support is needed to encourage local landowners to participate. Using existing ACP authorities, the ASCS provides cost-sharing for the installation of water management practices and related off-farm lateral distribution systems. Cost-sharing may be provided through annual practices or through long-term agreements (contracts) based upon complete onfarm water management and salinity control plans.

Grand Valley, Colorado

The Grand Valley project was initiated in 1979 as the first onfarm salinity control project in USDA. The implementation program is tailored to the USDA salinity control report, "Onfarm Program for Salinity Control, Final Report of the Grand Valley Salinity Study," dated December 1977, and Supplement No. 1 issued in March 1980.

The initial plan called for the treatment of approximately 53,000 acres with such things as: 1) irrigation system improvements like concrete lining, pipelines, gated pipe, measuring devices and water control structures; 2) land leveling for more uniform irrigation application; and 3) irrigation water management practices such as regulating the length of run, time of set, flow rates, and frequency of irrigation necessary to reduce deep percolation.

Supplement No. 1 also included provisions for limited improvements of off-farm lateral distribution systems which are important to the delivery of irrigation water to the onfarm irrigation systems. The design and construction of off-farm laterals are an integral part of the onfarm improvement program. Improvements and redesign of more efficient off-farm delivery systems have to be compatible with the location, elevation, and flow rates for onfarm irrigation systems.

When fully implemented, the onfarm improvement program is estimated to reduce Colorado River salt loadings by 130,000 tons per year with an additional 100,000 tons per year being eliminated by related USDA off-farm lateral improvements.

In 1982, SCS created an irrigation water management (IWM) specialist position to devote more attention to the onfarm IWM follow-up program. As irrigation systems are improved, it becomes extremely critical that the farm operator (or irrigator) improve his irrigation techniques and minimize deep percolation to fully achieve the salt load reduction objectives of the program. It is the continued operation and maintenance of onfarm irrigation systems and improved irrigation water management which work toward reducing deep percolation and subsequntly reduced salt loads to the Colorado River.

Under the ACP Program, ASCS received 239 individual requests in 1982. Of these, SCS serviced 228 with 185 completing one or more practices. Since 1979, over 1,400 separate requests for cost-share assistance have been received with nearly 900 participants actually completing an irrigation water management and salinity control practice. While the project relies heavily on annual ACP requests and practices, there have been 12 LTA's on 2,222 acres developed since 1979. Two LTA contracts on 135 acres were completed in 1982. The SCS has also assisted in the development of 48 IWM plans on 1,352 acres in 1982, bringing the total number of IWM plans to 195 on 5,473 acres. Actual IWM/salinity control practices applied in 1982 and cumulative to date accomplishments are presented in Table IV-2.

Table IV-2

Grand Valley Irrigation Water Managment
& Salinity Control Practices Applied

Practices	Unit	1982 1/	Cumulative
Off-farm Related Laterals			
Pipeline	Ft.	35,672	136,518
Ditch Lining	Ft.	1,607	56,241
Structures	No.	40	107
Onfarm Improvements			
Pipeline	Ft.	68,213	219,284
Ditch Lining	Ft.	37,750	127,252
Gated Pipe	Ft.	43,490	114,945
Land Leveling	Ac.	343	1,782
Structures	No.	50	130
Drip/Sprinkler Systems	No.	—	8

1/ 1982 Fiscal Year

The cumulative impacts of these practices and improved irrigation water management represent a 3,555 acre feet reduction in deep percolation per year with an equivalent salt load reduction of 17,700 tons per year. This salt load reduction translates into a 1.84 mg/l reduction in salinity concentrations at Imperial Dam.

Uinta Basin, Utah

The Uinta Basin salinity control project, initiated in 1980, is the second and only other Title II USDA onfarm program underway at this time. The project is being implemented consistent with "USDA Salinity Report, Uinta Basin Unit, Utah" published January 1979 and supplemented by a November 1980 Addendum. The implementation plan includes the installation of sprinkler systems on 79,000 acres and improved surface irrigation systems on 43,000 acres. Other associated water management practices are included in the land treatment phases of the project for salinity control. The total estimated salt load reduction estimates for the fully implemented Uinta Basin report is 76,600 tons per year.

Present technical staffing has increased to 17 in 1982. Of these, there are two biologists, seven soil conservationists, three engineers, and three soil conservation technicians. Major technical assistance emphasis has been given to developing complete IWM plans as a basis for long-term agreements, to design and install water management practices, and to onfarm IWM follow-up.

The implementation strategy for the Uinta Basin was to target salinity control planning and application to priority areas within the project. The initial USDA salinity control study looked at nine different evaluation units and treated each area as a separate subunit to the entire Uinta Basin. As implementation started in 1980, the Dry Gulch area was identified for priority assistance. Since then implementation focus has been expanded to the Pelican Lake area. This feature has provided for much higher visability and localized impacts at the project level.

A second feature to the Uinta Basin implementation strategy included the use of complete IWM and salinity control plans as a basis for USDA cost-sharing through LTA's. The LTA approach provides for a more substantial commitment on behalf of the farmers and USDA, as well as providing assurance that long-term cost-share provisions will be locked-in for the life of the agreement. This allows for more comprehensive and effective onfarm planning and application. There are also annual cost-share provisions for those landowners who do not wish to participate in the LTA program. Pooling agreements with groups of landowners are also key features to project implementation through the ACP program.

Under the LTA phase of the program, 139 applications covering 11,954 acres were received in 1982. This makes a total of 313 applications on 32,892 acres since this project started. Plans have been developed and contracts formalized for 48 pooling agreements (4,108 acres), and three individual (258 acres) in 1982. Since 1980, this makes a total of 162 LTA contracts on 17,501 acres. This represents approximately 50 percent of the total applications received to date. Annual practice requests for 1982 totaled 25 which included 15 pooling agreements and 10 individuals. A total of 93 annual practice requests have been received since 1980. In 1982, SCS fully serviced 44 annual ACP referrals with 29 participants completing their practices. Fourteen applicants cancelled their requests for cost-share assistance.

Table IV-3 presents a summary of the practices applied in the Uinta Basin. The cumulative effects of these practices has served to raise irrigation efficiencies on about 1,470 acres from an average of 30 percent "before" to approximately 55 percent "after" practices were applied and maximum IWM has been achieved. This results in an estimated 5,354 acre feet per year reduction in deep percolation and an annual salt load reduction of 12,850 tons for the project. At Imperial Dam, this salt load reduction translates into a 1.34 mg/l reduction in Colorado River salinity concentration.

Table IV-3

Uinta Basin Irrigation Water Management
& Salinity Control Practices Applied

Practices	Units	1982	Cumulative
Pipeline (LTA) 1/	Ft.	134,108	506,825
(ANN) 2/	Ft.	19,031	132,008
Sideroll Sprinkler (LTA)	Ft.	51,425	94,421
(ANN)	Ft.	6,980	60,580
Pivot Sprinkler (LTA)	Ft.	4,695	8,557
Gated Pipe (LTA)	Ft.	29,947	56,957
(ANN)	Ft.	3,760	7,910
Reg. Reservoir (LTA)	Ea.	3	15
(ANN)	Ea.	--	3
Pump & Motor (LTA)	Ea.	14	36
(ANN)	Ea.	--	7
Land Leveling (LTA)	Ac.	158	243
(ANN)	Ac.	34	123
Irrigation Water Management (LTA)	Ac.	590	1,471
Wildlife Habitat Management (LTA)	Ac.	435	528
Nesting Platform (LTA)	Ea.	5	5
Wildlife Seeding (LTA)	Ac.	4	4
Shallow Water Areas	Ac.	10	10

1/ LTA is Long Term Agreement referrals

2/ ANN is annual ACP cost-share referrals

C. Extension Education

The ES is using general appropriation funds to conduct demonstration, information, and education programs. Extension specialists conduct water management workshops and other educational programs for farmers, technicians, county agents, and personnel of agricultural service and supply firms. Extension specialists also work with farmers in fine tuning irrigation practices to improve the irrigation efficiency and economy of operations. The ES, through the State Cooperative Extension Service (CES) in Utah and Colorado, has continued to provide this extension education support.

In the Grand Valley, the ES worked with the BR and the Colorado CES to develop a special extension education effort to assist both the BR canal and lateral lining activities and the USDA onfarm program. Through Memoranda of Understanding and working cooperative agreements, the Colorado CES has provided a full time extension specialist to assist in the Grand Valley project area. Major activities include working with landowners and irrigators to more formally organize working groups on the many irrigation distribution laterals. The extension specialist will also be assisting with USDA information and educational follow-up activities aimed at improving onfarm irrigation water management. Funds to support this education effort are being provided by the BR to Colorado CES through a reimbursable agreement with ES. Funding will continue through FY-83 for this extension education support at which time USDA and the Colorado CES will be expected to fund the position.

D. Research and Demonstration

USDA research and demonstration activities are vital to the continued development and improvement of new water management techniques and technologies which are beneficial to salinity control. The ARS, through the U.S. Salinity Lab at Riverside, California is involved in two research efforts related to the use of saline or brackish water (saline irrigation and drainage return flows) and the measurement of soil salinity with an electro-magnetic probe.

In the Imperial Valley, a large field experiment was initiated in January 1982 in cooperation with Imperial Valley Irrigation and Drainge District, California Division of Water, University of California, and private landowners, to develop management strategies for reusing drainage flow water, now wasted to the Salton Sea, as irrigation water. Use of such water would permit, in principle, a significant reduction in diversions to Imperial Valley without reduction in area irrigated, and thus would free Colorado River water for alternative uses.

A 40-acre area has been leveled into two 20-acre fields, each divided in roughly 1-acre plots. Two different cropping patterns are planned (wheat/sugar beets/lettuce and cotton/cotton/wheat/alfalfa) to assess not only the use of brackish water for tolerant crops, but also the potential of "rapid" shifts between growing salt tolerant and salt sensitive crops. Colorado River water and drain water are used sequentially as needed; they are not mixed.

On half the area, a crop was followed by beets, as planned; and a cotton crop was grown on the other half. Currently the cotton crop has matured and the beet crop is in the field. It is too early to present meaningful results, but experience to date is "on target".

The ARS, working in cooperation with the BR, also has a project underway to develop a nondestructive probe that can measure soil salinity status in a manner analogous to the soil water content measurement with a neutron probe.

The probe, an adaptation of a commercially available instrument that measures soil salinity of a profile from the surface, would provide more accurate and depth-specific data with high repeatability over time. The development has been set back by electronic difficulties encountered by a contractor, but recent results are promising.

In the Uinta Basin and Grand Valley projects, farmers with cablegation (automated) irrigation systems report that additional irrigations do not appreciably increase their irrigation costs. Consequently, they apply less total water than when they hand set their irrigations. Limited data collected to date by ARS and Colorado State University (CSU) indicate that this type of irrigation system increases yields and substantially decreases deep percolation. More data are needed to quantify the results of automation. Measuring and recording equipment will be needed to accomplish this objective.

The change of policy in Grand Valley which made automation a voluntary rather than compulsary condition for cost-sharing of irrigation improvements resulted initially in the installation of fewer automated systems. However, the excellent performance of some of the new automated systems developed by ARS and SCS, and satisfaction of their owners, are developing a situation where automation will be more widely accepted on its own merits.

In the Grand Valley, studies of level-basin irrigation on two major soil types are nearly complete. The results indicate that level basins are a practical and effective way of applying surface irrigation water. About 1/3 of the irrigated lands in the Grand Valley have deep enough soils and flat enough slopes to allow practical basin leveling. Level-basin irrigation eliminates surface runoff, allows close control of deep percolation, requires no more energy than traditional surface irrigation methods, simplifies irrigation water management, and reduces labor requirements or can easily be automated. Yields of corn, alfalfa and small grains during five years of study have equaled and in some cases significantly exceeded Grand Valley average yields.

The second year's data have been obtained from a study of crop water use from high, saline water tables. Results to date indicate that water tables 60 cm and 105 cm below the soil surface can contribute significantly to water needs of corn and alfalfa, even though the water is highly saline. Established alfalfa obtained all water needed for evapo-transpiration during 1982 from a 60 cm water table. However, surface irrigation is still needed to prevent salt buildups at the soil surface. Methods of modifying irrigation scheduling procedures to account for high water table contributions will be developed after additional data are collected.

A final report has been issued in a cooperative study with CSU on design of irrigation pipelines to transport sediment laden irrigation water without excessive deposition, and on design of irrigation pipe turnouts from canals to minimize diversion of sediment into the pipelines. Another phase of the same study has evaluated techniques for minimum tillage of corn under graded furrow irrigation in the Grand Valley.

E. Monitoring and Evaluation

Monitoring and evaluation (M&E) activities have been extremely limited since initiation of the Uinta Basin and Grand Valley projects. The Utah Bureau of Water Pollution Control has recently completed a two-year monitoring program which essentially collected and established some baseline data. It included measurements on several stream sites, in return flow drainageways, and in some groundwater observation wells.

The SCS also provided funding for limited irrigation water management field monitoring by CSU in the Grand Valley in the 1980, 1981, and 1982 irrigation seasons. This field monitoring was to evaluate some of the furrow irrigation design criteria, and to monitor results of several onfarm irrigation improvements to determine implementation needs or modifications which would be useful to the program. CSU was also to evaluate effectiveness on reducing deep percolation and Colorado River salt loading from several irrigation systems. Copies of the February 1982 report are available through SCS or ARS.

Two significant 1982 monitoring activities included 1) the development of long-term monitoring plans from the Uinta Basin and Grand Valley projects and, 2) the installation of a "popcorn" data collection site in the Uinta Basin for irrigation management schedules and monitoring purposes. The long-term monitoring plans were developed to provide a basis for staffing and funding monitoring activities to evaluate program implementation impacts on water management, deep percolation, and salt load reductions. The monitoring plan is designed to evaluate a cross-section of various onfarm irrigation systems and will serve as a basis to more accurately determine project impacts. Major components of the plans include onfarm irrigation evaluations, wetland and wildlife habitat evaluations, data collection and analyses, plus an economic evaluation component to be added later.

The installation of an automated instrumentation site (Popcorn trade name) in the Pelican Lake area in 1982 is a new SCS endeavor to expand the SNOTEL (Snow Telementry) data collection system. Essentially, the "popcorn" site field installation will be used to automatically collect field data to be transmitted via telecommunication to the SNOTEL remote sensing network. The SNOTEL network, presently used for snow surveys and water (snow-melt) forecasting in the West, then transmits field data to computer access terminals where data can be recorded, stored, processed and analyzed.

The Popcorn site will collect data which influence evapo-transpiration rates used in irrigation water management scheduling. The unit will collect and transmit hourly readings on wind run, solar radiation, precipitation, daily maximum-minimum-mean temperature, humidity, soil moisture, and soil temperature. Instrumentation of flow measuring devices will also be a part of the automated data collection process. The information will be used as a part of the monitoring program and will also be used to assist with better irrigation scheduling.

The M&E plans have been developed with a broad cross-section of State and Federal interagency inputs. The activities are to be coordinated with other agencies to avoid duplication and to assure that the data collection and analysis will be complementary to the monitoring efforts of others.

V. INSTITUTIONAL AND INTERAGENCY COORDINATION

Under authority of Title II of the Colorado River Basin Salinity Control Act, an Advisory Council was created. The Advisory Council is composed of State representatives appointed by Governors of the seven Basin States. The Council is advisory only, and is established to act as liaision between USDI, USDA, EPA, and the Basin States.

USDI national program leadership has been delegated to the USBR. To provide for interagency coordination, BR established a Federal Interagency Salinity Control Committee composed of all Federal agencies either participating or interested in the salinity control program. Primary participants of this committee include USBR, Bureau of Land Management (BLM), EPA, Fish and Wildlife Services (FWS), U.S. Geological Survey, ARS, and SCS. Major Federal interagency coordination has been achieved through this committee. The committee provides an opportunity to coordinate planning and implementation schedules, to surface and resolve technical and programmatic issues, and to provide for open communication and free flow exchange of information between the agencies.

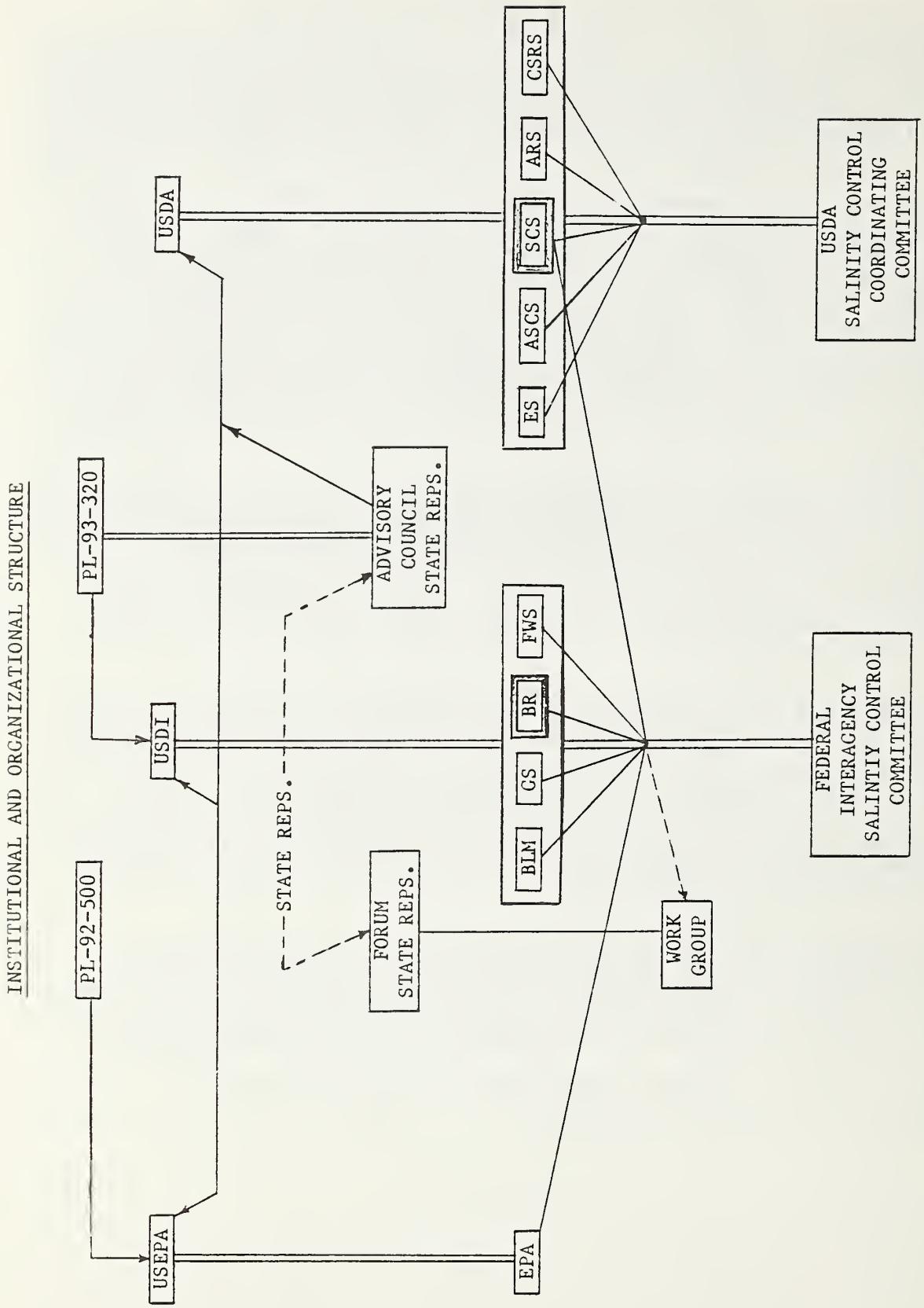
Within USDA, the Secretary of Agriculture has designated SCS as lead agency responsible for the USDA coordination necessary to implement efficiently the provision of the Act. Within the scope of that responsibility, SCS has designated Mr. Edgar Nelson, Director, Basin and Area Planning Division, as the USDA Salinity Control Liaison Officer. A separate USDA Salinity Control Coordinating Committee provides for internal USDA coordination between ARS, ASCS, ES, CSRS, and SCS.

Another major group, the Colorado River Basin Salinity Control Forum, is also a key participant in the institutional and organizational structure of the program. The Forum was established by the seven Basin States in response to the Clean Water Act of 1977 (Public Law 92-500). The Forum was created by the States to provide a procedure for developing and reviewing water quality standards for the Colorado River as required in Section 303 of the Clean Water Act. In many cases, the same people are on both the Forum and the Advisory Council because both deal with water quality standards and numeric salinity standards for the Colorado River.

Created within the Forum is a technical "Work Group" to provide technical support and backup for the full Forum membership. In addition to Forum members, a number of Federal advisory representatives also serve on this "Work Group" including USBR, BLM, FWS, EPA and SCS. The "Work Group" essentially prepares working documents for consideration by the full Forum membership.

Figure V-1 provides a general illustration of the institutional and organizational structure in the CRBSCP.

Figure V-1


INSTITUTIONAL AND ORGANIZATIONAL STRUCTURE
PL-92-500
PL-93-320
USEPA
USDI
USDA
EPA
ADVISORY COUNCIL STATE REPS.
FORUM STATE REPS.
STATE REPS.
WORK GROUP
BLM
GS
BR
FWS
ES
ASCS
SCS
ARS
CSRS
USDA SALINITY CONTROL COORDINATING COMMITTEE
FEDERAL INTERAGENCY SALINTIY CONTROL COMMITTEE

VI. FUNDING AND BUDGETING

For FY-83, USDA has continued to use multiple agency funding procedures. Various agency budgets for FY-83 were formulated independently and submitted through the normal budgeting process with no real effort to correlate or consolidate the CRBSCP funding levels. The general breakdown on agency funding levels for 1983 are as follows:

	FY-83	Change Over FY-82
SCS - Technical Assistance	$ 500,000	$ same
Salinity Units Studies	0	-200,000
ASCS - Cost Shares (ACP)	3,700,000	same
ARS - Research & Demonstration	1,000,000	+600,000
CSRS - Research Support	0	-161,000
ES - Extension Education	0	-250,000
TOTAL	5,200,000	-11,000

These funding levels essentially allow USDA to continue with the two implementation projects and to expand ARS research efforts. CSRS and ES activities are not funded for FY-83. There are no funds provided for SCS salinity control unit studies in FY-83.

ARS reports the $600,000 increased funding will be used to expand research on salinity control in the Colorado River Basin. A coordinated research approach and implementation plan involving several ARS locations is currently being developed.

During the past year, USDA did develop a proposal for a consolidated account to cover the USDA CRBSCP in FY-84. With the support and concurrence of the Under Secretary for International Affairs and Commodity Programs and the Assistant Secretary for Natural Resources and Environment, ASCS and SCS took the leadership to develop a fully coordinated budget package. Included within the consolidated account are funds for ASCS, SCS, and ES. The funds will provide for cost-sharing, technical assistance, salinity studies, monitoring, and extension education support. Research funding for ARS and CSRS were not included in the consolidated account at this time.

A component of the FY-84 consolidated budget proposal was a "modified" USDA CRBSCP implementation schedule. Previous implementation schedules showed rapid increases in funding levels from $5.0 million per year to in excess of $50.0 million per year in less than four years. Table VI-1 presents the "modified" USDA implementation costs and distribution which shows gradual funding increases with a peak ceiling of approximately $25.0 million per year in FY-88 through FY-93. The implementation time frame was extended by six years to be completed by the year 2000.

This modified implementation schedule presents a more gradual and realistic transition into full scale implementation of the various USDA onfarm salinity control projects. Figure VI-1 identifies the proposed projects and present implementation schedule for onfarm salinity controls. While this schedule may be changed, and is, of course, subject to Congressional funding, USDA feels that through this schedule the Colorado River salinity control objectives and water quality standards can still be achieved while States continue to more fully develop their compact-apportioned water supplies.

USDA
Colorado River Basin Salinity Control Program

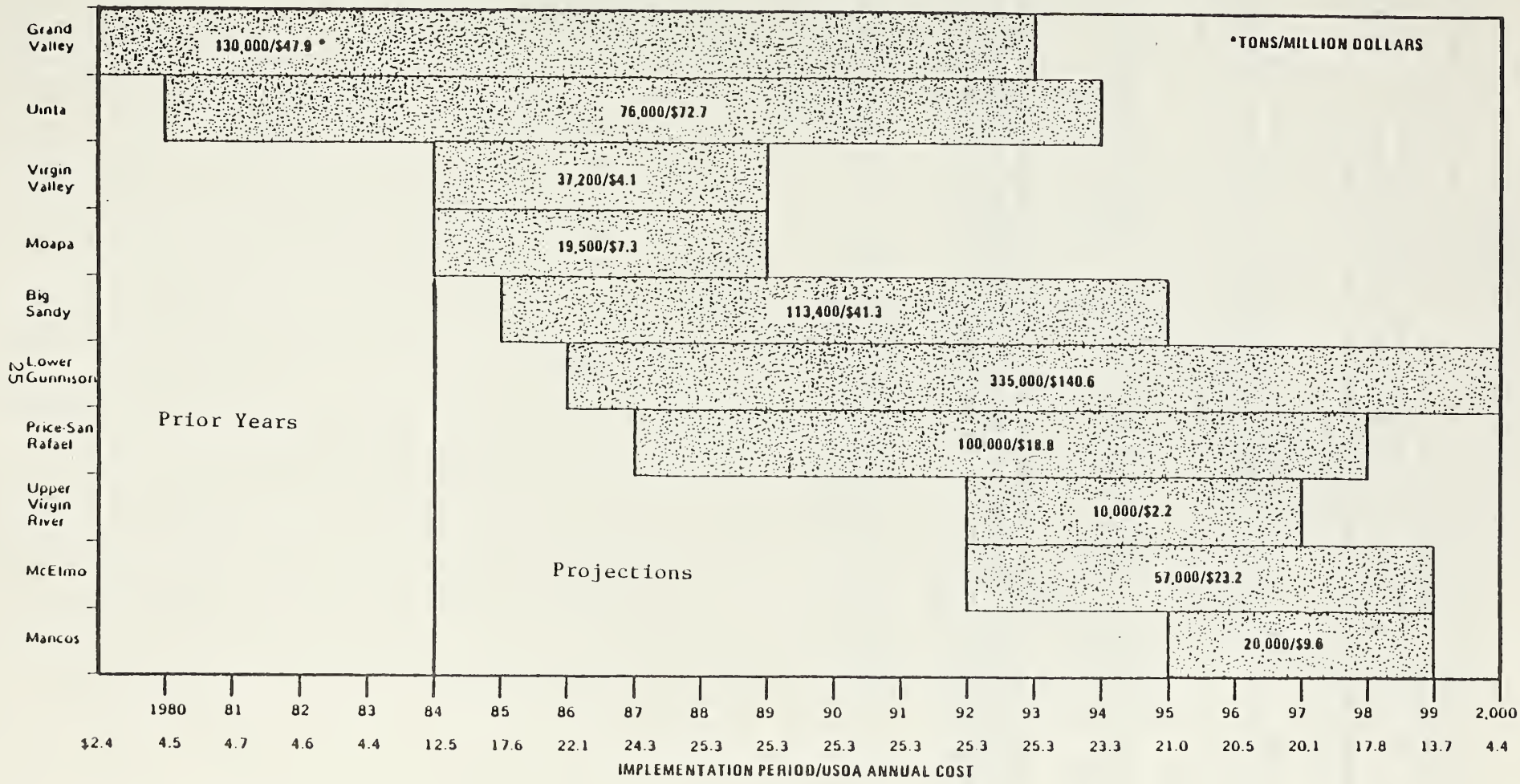
Implementation Costs and Distribution
($ millions)

Agencies and Activities 1/	Prior Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000	Totals
1. ASCS Cost Shares	16.5	10.0	13.6	17.1	18.6	19.5	19.9	19.9	19.9	19.9	19.9	18.0	16.3	15.8	15.4	13.8	9.7	2.7	286.5
2. SCS Technical Assistance	2.6	1.5	2.7	3.4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.2	3.5	3.5	3.5	3.0	3.0	1.0	59.9
Monitoring and Evaluation	0	0.7	0.8	0.8	1.0	1.0	0.8	0.8	0.8	0.7	0.8	0.6	0.8	0.8	0.8	0.6	0.6	0.6	13.0
Basin Studies	1.5	0.1	0.2	0.2	- - - - - - - - - - - - - - - - Undetermined - - - - - - - - - - - - - - - -														2.0
Subtotal SCS	4.1	2.3	3.7	4.4	5.0	5.0	4.8	4.8	4.8	4.7	4.8	4.8	4.3	4.3	4.3	3.6	3.6	1.6	74.9
3. Ext. Service Education Assistance	0	0.2	0.3	0.6	0.7	0.8	0.6	0.6	0.6	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.1	8.3
USDA Total Costs	20.6	12.5	17.6	22.1	24.3	25.3	25.3	25.3	25.3	25.3	25.3	23.3	21.0	20.5	20.1	17.8	13.7	4.4	369.7
No. of Projects	2	4	5	6	7	7	5	5	5	7	6	5	5	5	4	3	3	1	XX

1/ Research Activities of ARS and CSRS excluded.

Table VI-1

USDA
COLORADO RIVER BASIN SALINITY CONTROL PROGRAM
Cost, Implementation Schedule, and Salt Reduction Upon Completion



Total Salt Reduction = 898,000 Tons Per Year
Total Cost = $369.7 Million (Includes $2.0 Million for Basin Studies)
Total Economic Benefit = $529.8 Million Per Year

Figure VI-1

VII. LEGISLATIVE ACTIVITIES

There were numerous 1982 USDA legislative activities regarding the CRBSCP. With the support of the seven Basin States as expressed through the Advisory Council and Forum, Senator William Armstrong (D-CO) introduced legislation (S.2202) to amend the Colorado River Basin Salinity Control Act of 1974. Congressman Ray Kogovsek (R-CO) introduced a nearly identical bill (HR-6097) in the U.S. House of Representatives.

The essence of both bills included an expansion of BR planning and construction authorizations, the authorization of a separate USDA CRBSCP, and provisions for reimbursement of USDA Federal salinity control cost-share expenditures with power revenues from the upper and lower basin development funds.

Through SCS and ASCS, USDA worked with the USDI (USBR) and USEPA to help formulate an official Administration position. Chief Peter C. Myers of SCS testified on behalf of USDA at the Senate legislative hearing.

SCS and ASCS also worked with Department officials to develop a special USDA legislative proposal which would provide the Secretary of Agriculture with the necessary legislative authority to implement the funding program proposed in the FY-84 budget package.

VIII. PROJECTED 1983 ACTIVITIES

USDA will continue to be involved with many of the same activities in 1983 as in previous years; however, some new and expanded initiatives will be undertaken.

Continued activities will include a limited amount of salinity control planning in two irrigation salt source areas. Continued followup in the Price-San Rafael (UT) study and completion of the Mancos Valley (CO) study is scheduled. Implementation of the Wellton-Mohawk Title I project and the Grand Valley and Uinta Basin Title II projects will be continued at approximately the same level of intensity. Extension education support will also be continued.

Expanded initiatives include the broadened scope of salinity control research through the ARS. This activity is very important for the continued development and advancement of new irrigation water management and salinity control technology.

Implementation of a long term monitoring and evaluation plan will be undertaken in 1983. The monitoring plans, staff and funding needs, as well as equipment needs have been developed and partially funded. SCS proposes to initiate this monitoring effort during the 1983 irrigation season. The entire monitoring program is scheduled to be fully implemented by 1985.

Legislative activities will also be prompting some new USDA CRBSCP initiatives. In addition, specific program rules and regulations for implementing the program will be developed following legislation.

*U.S. Government Printing Office 1983 -380-931/245